COMMONWEALTH of VIRGINIA

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COMMONWEALTH OF VIRGINIA
Department of Environmental Quality
Southwest Regional Office

STATEMENT OF LEGAL AND FACTUAL BASIS

Clinch River Plant
Appalachian Power Company (APCO)
d.b.a., American Electric Power (AEP)
Carbo, Russell County, Virginia
Permit No. SWRO10236

Title V of the 1990 Clean Air Act Amendments required each state to develop a permit program to ensure that certain facilities have federal Air Pollution Operating Permits, called Title V Operating Permits. As required by 40 CFR Part 70 and 9 VAC 5 Chapter 80, American Electric Power has applied for a significant modification to the Title V Operating Permit for its Clinch River Plant located at Carbo, Russell County, Virginia. The Department has reviewed the application and has prepared a Title V Operating Permit.

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FACILITY INFORMATION

Permittee
Clinch River Plant
Appalachian Power Co. (APCO)
d.b.a., American Electric Power (AEP)
1 Riverside Plaza
Columbia, OH 43215-2373

NET Facility ID No. 51-167-0003
ORIS Code: 3775

SOURCE DESCRIPTION

NAICS Code: 221112 – Electric Services (fossil fuel power generation)

The Clinch River Plant is a coal-fired electric power generating facility located at Carbo in Russell County, Virginia. The facility utilizes three (3) vertically-fired Babcock and Wilcox radiant tube boilers, each nominally rated at 2,100.9 million Btu (MMBtu) per hour design heat input capacity. The high pressure, high temperature steam produced by each boiler is used to turn turbines (two per unit) which are coupled to electric generators. Each of the three units is nominally rated at 235 net megawatts (MW) of electricity.

Units #1 and #2 were constructed in 1958 and Unit #3 was constructed in 1961. Each of the three units is fired by coal and distillate oil (but each also has the capacity to burn used oil, ion exchange resins, and metal cleaning fluid as supplemental fuels). Distillate oil is used during startup conditions before the coal is introduced into the boilers, and for flame stabilization and unit shutdown.

In January 2009, the Clinch River Plant began operating selective non-catalytic reduction (SNCR) systems on each boiler to reduce nitrogen oxide emissions. The SNCR systems inject liquid urea into the hot boiler combustion gas stream where it reacts with nitrogen oxides to form water, nitrogen, and carbon dioxide.

The plant began operating a coal blending system in February 2009, that allows coals of varying sulfur contents to be combined in controlled proportions to produce a plant feed with a specific sulfur content.

A screw conveying system was added in 2010 to allow hydrated lime and fly ash to be added to the raw coal feed to evaluate their effectiveness in reducing SO_2 emissions.

Emission units at the facility include the three Babcock & Wilcox (B&W) radiant tube boilers, the ash handling system, and the coal storage, blending, and handling systems.

The facility is a Title V major source of NO_X, SO_2, PM_{10}, CO, hydrogen fluoride, hydrochloric acid, and total hazardous air pollutant (HAP) emissions. This source is located in an attainment area for all criteria pollutants. The facility is permitted under a Phase II Acid Rain Permit that is effective from January 1, 2010 through December 31, 2014.

COMPLIANCE STATUS

The facility is inspected at least once every two years and the last full compliance evaluation (FCE) was conducted on July 23, 2010. The source was found to be in compliance with all applicable requirements.

FEDERAL AND STATE CONSENT ORDERS:

In July 2006, Dominion Virginia Power Company submitted a PSD permit application for the construction of a new coal-fired power plant to be located approximately eight miles west of the Clinch River Plant at Virginia City in neighboring Wise County, Virginia. The modeling report submitted for that PSD application indicated modeled violations of the National Ambient Air Quality Standard (NAAQS) that were attributed to the allowable SO_2 emissions from the Clinch River Plant.

In January 2008, APCO submitted air dispersion modeling results to DEQ that also predicted ambient air concentrations of SO_2 in excess of the NAAQS attributable to the allowable SO_2 emissions from the Clinch River Plant. Based on this modeling analysis, SO_2 emission limits of 1.08 lb/MMBtu (3-hour average) and 1.05 lb/MMBtu (24-hour average) would be needed to assure compliance with the 3-hour, 24-hour, and annual SO_2 NAAQS.

A Consent Order between APCO and DEQ was signed in June 2008 (and amended in August 2008), that reduced the allowable SO_2 emissions from the Clinch River Plant to levels that were modeled in compliance with the SO_2 NAAQS. These limits were incorporated into a federally-enforceable state operating permit (SOP) dated January 13, 2009 (as amended October 19, 2009). The SOP limits SO_2 emissions from each boiler stack to rates that the air dispersion computer modeling predicted would comply with the SO_2 NAAQS on a continuous basis.

In October 2007, American Electric Power (AEP) signed a consent decree with the US EPA to resolve several long-standing issues regarding potential-PSD modifications at a number of AEP's coal-fired power generating facilities. The consent decree requires the addition of pollution controls to several of the facilities in the AEP Eastern System and caps emissions from individual facilities and from the collective group as well. The Clinch River Plant is identified as one of the affected facilities in the Eastern Group.

The federal consent decree contains several requirements for the reduction of NO_X and SO_2 emissions from the Clinch River Plant. The decree specifies that the plant operate low NO_X burners (previously installed) and selective non-catalytic reduction (SNCR) systems on each unit. The SNCR systems were to be operational by December 31, 2009. There is no specific NO_X emissions limit on any single facility in the Eastern Group, but the group as a whole is limited to 96,000 tons beginning in 2009, and progressively reduces to 72,000 tons in 2016 and thereafter.

The federal consent decree limits the group as a whole to 450,000 tons of SO_2 starting in 2010 and progressively reduces to 174,000 tons in 2019 and thereafter. The decree also contains a specific limit on SO_2 emissions from the Clinch River Plant of 21,700 tons/yr between the years 2010 and 2014. Beginning in 2015 and continuing thereafter, the annual SO_2 limit drops to 16,300 tons/yr.

PERMIT ACTIONS INCORPORATING REQUIREMENTS FROM CONSENT ORDERS:

The federal consent decree specifies that the requirements of the decree be incorporated into a federally-enforceable non-Title V permit. The requirements from both the DEQ and EPA consent decrees were incorporated into a single federally enforceable state operating permit on January 13, 2009. The SOP was amended on October 19, 2009 to add specific SO_2 limits for each boiler stack.

A minor new source review (NSR) permit was issued to the Clinch River Plant on June 23, 2008 to add raw coal blending and processing equipment. This equipment allows different coals to be combined in controlled proportions to produce a plant feed with a sulfur content that results in post combustion SO_2 emissions that comply with the limits of the 2007 consent decree. This equipment, which consisted of five (5) conveyors and two (2) feeders, was not subject to the provisions of NSPS Y for coal preparation facilities. The coal blending operation is limited to processing a total of 2,771,400 tons/yr of coal.

The minor NSR permit was modified on August 27, 2008 to allow for the addition of the selective non-catalytic reduction (SNCR) equipment mandated by the October 2007 federal consent decree. These systems inject liquid urea into the boiler exhaust at designated locations where the temperature is within a specific range (1600° – 2100°F) for the urea to chemically react with the NO_X to produce N_2, H_2O and CO_2. If the temperature of the reaction zone is too low, ammonium sulfate particulates may be produced. Ammonium sulfate is a very fine particulate (1 to 3 microns) and ammonium bisulfate is a highly acidic compound that can create significant fowling problems in air preheaters and ESP's. The NSR permit limits the ammonia slip in each boiler exhaust to 2.0 ppm as a monthly average to minimize the potential for sulfate particulate formation and emissions.

The minor NSR permit was modified once again on March 23, 2010, to add a screw conveying system for hydrated lime and fly ash feed additive testing. These tests were conducted to evaluate the effectiveness of these coal feed additives for reducing SO_2 emissions.

IDENTIFICATION OF EMISSION UNIT AND CONTROL DEVICE CHANGES:

The changes to the emissions units at this facility consist of the following:

Raw Coal Blending – In order to comply with the initial requirements of the 2007 federal consent decree to limit SO_2 emissions from the Clinch River Plant to 21,700 tons/yr, APCO decided to reduce the sulfur content of the coal feed to the facility. This would be done by blending low sulfur coals from the western US with coals from local providers. In February 2009, the Clinch River Plant began operating new raw coal blending equipment consisting of:

- One 950 ton/hr coal stackout conveyor (Conveyor 2);
- Two 450 ton/hr dozer trap feeders (BDT1 and BDT2);
- Two 450 ton/hr feed transfer conveyors (Conveyors BF1 and BF2); and
- Two 450 ton/hr transfer conveyors (Conveyors B1 and B2):

The new coal processing and handling equipment was not subject to NSPS Subpart Y since the facility does not meet the definition of a coal preparation plant (any facility which prepares coal by breaking, crushing, screening, wet or dry cleaning, and/or thermal drying). And since none of

the transfer and conveying equipment transfers coal to or carries coal from an affected facility, none of the equipment is part of an affected facility and none is subject to NSPS Subpart Y.

Hydrated Lime and Fly Ash Additive – As a part of efforts to identify cost effective means to reduce SO_2 emissions from the Clinch River Plant, tests were conducted to evaluate the performance of hydrated lime and fly ash as coal feed additives. The equipment utilized for this testing consisted of a 2.7 ton/hr screw conveyor with a hopper. This equipment was added to the minor NSR permit on March 23, 2010.

The hopper and screw conveyor were not subject to NSPS Subpart Y since the facility does not meet the definition of a coal preparation plant, and neither piece of equipment transfers coal to or carries coal from an NSPS Y affected facility.

Selective Non-Catalytic Reduction (SNCR) Systems – The SNCR systems required by the 2007 federal consent decree were added to the minor NSR permit in August 2008. The consent decree does not specifically limit NO_X emissions from the Clinch River Plant however it does limit the annual NO_X emissions from the "AEP Eastern System" as a group.

The SNCR systems at Clinch River inject liquid urea into the boiler exhaust at designated locations where the temperature is within a specific range (1600° – 2100°F) for the urea to chemically react with the NO_X to produce H_2O, N_2 and CO_2.

Excess urea and/or insufficient reaction temperatures can result in excess ammonia in the exhaust gas. This excess is known as "ammonia slip" and it can react with sulfur oxides in the exhaust to produce ammonium sulfate particulates. Ammonium sulfate is a very fine particulate (1 to 3 microns) and ammonium bisulfate is a highly acidic compound that can create significant fowling problems in air preheaters and ESP's. One key parameter used to minimize the ammonium sulfate formation is to closely monitor and maintain a low ammonia slip.

The minor NSR permit dated March 23, 2010, limits the ammonia slip from each boiler to not more than 2.0 ppm as a monthly average. PM-10 emissions resulting from the operation of the SNCR systems are limited to 0.997 lbs/hr per boiler and 13.10 tons/yr combined. Compliance with the 2.0 ppm ammonia slip limitation may be used to demonstrate compliance with the PM-10 emission limitations.

IDENTIFICATION OF NEW APPLICABLE REQUIREMENTS FOR EMISSION UNITS AND CONTROL DEVICES:

Raw Coal Blending Equipment:

- Emission Controls - Particulate emissions from the blend coal equipment (Reference No.'s BDT1, BDT2, BF1, BF2, and Conveyors 2, B1, and B2) shall be controlled by wet suppression, or equivalent. The wet suppression system shall be provided with adequate access for inspection.
  (9 VAC 5-50-260, 9 VAC 5-80-1180, and Condition 3 of the NSR permit dated 3/23/2010)
- Throughput - The throughput of coal to the blend coal equipment (Reference No.'s BDT1, BDT2, BF1, BF2, and Conveyors 2, B1, and B2) shall not exceed 2,771,400 tons per year, calculated monthly as the sum of each consecutive 12-month period. Compliance for the

consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9 VAC 9 VAC 5-80-1180 and Condition 7 of the NSR permit dated 3/23/2010)

- Emission Limits – PM-10 emissions from the operation of the blend coal equipment (Reference No.'s BDT1, BDT2, BF1, BF2, and Conveyors 2, B1, and B2) shall not exceed 0.51 lbs/hr and 1.36 tons/yr. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits shall be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined as stated in Conditions 3 and 7 of the NSR permit dated March 23, 2010.
(9 VAC 5-50-260, 9 VAC 5-80-1180, and Condition 9 of the NSR permit dated 3/23/2010)
- Visible Emission Limit - Visible emissions from the blend coal equipment (Reference No.'s BDT1, BDT2, BF1, BF2, and Conveyors 2, B1, and B2) shall not exceed twenty percent (20%) opacity as determined by EPA Method 9 (reference 40 CFR 60, Appendix A). This condition applies at all times except during startup, shutdown and malfunction.
(9 VAC 5-50-80, 9 VAC 5-50-260, and Condition 11 of the NSR permit dated 3/23/2010)

Hydrated Lime and Fly Ash Additive:

- Emission Controls - Particulate emissions from the coal additive screw conveyor system (Reference No. SC-1) shall be controlled by full enclosure, or equivalent. The coal additive screw conveyor system and enclosure shall be provided with adequate access for inspection.
(9 VAC 5-50-260, 9 VAC 5-80-1180, and Condition 2 of the NSR permit dated 3/23/2010)
- Throughput – The throughput of hydrated lime and/or fly ash in the coal additive screw conveyor (Reference No. SC-1) shall not exceed 100 tons per year, calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
(9 VAC 5-50-260, 9 VAC 5-80-1180, and Condition 5 of the NSR permit dated 3/23/2010)
- Visible Emission Limit - Visible emissions from the coal additive screw conveyor system (Reference No. SC-1) shall not exceed ten percent (10%) opacity as determined by EPA Method 9 (reference 40 CFR 60, Appendix A). This condition applies at all times except during startup, shutdown and malfunction.
(9 VAC 5-50-80, 9 VAC 5-50-260, and Condition 10 of the NSR permit dated 3/23/2010)

Babcock and Wilcox Radiant Tube Boilers

SO_2 Emission Limitations:

Sulfur Dioxide Limit	Stack 1	Stack 2
3-Hour Block Average*	1.08 lbs/MMBtu	1.08 lbs/MMBtu
	4537.94 lbs/hr	2268.97 lbs/hr

Sulfur Dioxide Limit	Stack 1	Stack 2
24-Hour Block Average*	1.05 lbs/MMBtu	1.05 lbs/MMBtu
	105,886 lbs/day	52,943 lbs/day
Annual Total	19,324 tons/yr	9,662 tons/yr
Facility Total - Calendar years 2010 - 2014 - Calendar years 2015 and thereafter	21,700 tons/yr 16,300 tons/yr	

(9 VAC 5-80-850 and Condition 5 of the SOP dated 1/13/2009 (as amended 10/19/2009))

NO_X Emissions Control Requirements:

- SNCR Ammonia Slip – The ammonia slip in each boiler exhaust shall not exceed 2.0 parts-per-million (ppm) as a monthly average. The ammonia slip in each boiler exhaust shall be monitored continuously and the average hourly concentration shall be recorded. The average monthly concentration shall be determined as the sum of the hourly concentrations recorded during that month divided by the unit operating time in hours.
(9 VAC 5-50-260, 9 VAC 5-80-1180, and Condition 6 of the NSR permit dated 3/23/2010)
- Emission Limits – PM-10 emissions from the operation of the selective non-catalytic reduction systems (Reference No.'s SNCR1, SNCR2, and SNCR3) shall not exceed 0.997 lbs/hr per boiler and 13.10 tons/yr combined. These emissions are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits shall be considered credible evidence of the exceedance of emission limits. Compliance with these emission limits may be determined by demonstrating compliance with the average monthly concentration of ammonia slip limitation.
(9 VAC 5-50-260, 9 VAC 5-80-1180, and Condition 8 of the NSR permit dated 3/23/2010)

Compliance Assurance Monitoring (CAM)

A Title V source is subject to 40 CFR Part 64 – Compliance Assurance Monitoring (CAM) if each of the following conditions are met:

- Emits or has the potential to emit uncontrolled quantities of one or more regulated air pollutants at or above major source levels;
- Is subject to one or more emission limitations for the regulated air pollutants for which it is major, and;
- Uses an add-on control device to achieve compliance with the emissions limitations.

The Clinch River facility has the potential to emit major quantities of particulate (PM-10), nitrogen oxides (NO_X), sulfur dioxide (SO_2), volatile organic compounds (VOC), carbon monoxide (CO), hydrogen chloride (HCl), hydrogen fluoride (HF), and total hazardous air pollutants (HAP). The facility is subject to emission limitations on particulate, SO_2, and NO_X. The Clinch River facility utilizes add-on electrostatic precipitators (ESP's) to control particulate emissions. Therefore, CAM is appropriate for the ESP's. Since the only specific NO_X limitations on the boilers at the Clinch River Plant are those from the acid rain program

(and the acid rain program requirements are exempted from the CAM rule), the add-on SNCR units are not subject to CAM.

New Monitoring Recordkeeping Requirements:

- The B&W Radiant Tube Boilers' exhaust stacks shall be equipped with devices to continuously measure and record the concentrations of sulfur dioxide emissions. Each monitoring device shall be installed, maintained, calibrated and operated in accordance with approved procedures which shall include, as a minimum, the manufacturer's written requirements or recommendations. Each monitoring device shall be provided with adequate access for inspection and shall be in operation when the boilers are operating. Data from sulfur dioxide continuous emission monitoring systems that were installed and in operation at this source prior to January 13, 2009, that also meet all applicable regulatory requirements, may be used to meet the monitoring requirements of this condition. (Condition 2 of the SOP dated 1/13/2009 (as amended 10/19/2009))

- The coal fuel shall be sampled and analyzed in such a manner and at appropriate location(s) to obtain representative data of sulfur content on an as-fired basis. Fuel sampling shall be conducted in accordance with ASTM Method D2013, D2234, or other DEQ-approved methods. Fuel analyses shall be conducted in accordance with test methods D2492, D3177, or D4239 for sulfur content, and D5865 for calorific (Btu) content, or other DEQ-approved methods. The results of the fuel analyses shall be reported to the DEQ, Director Southwest Regional Office quarterly, within 30 calendar days after the end of the calendar quarter. The report shall contain the dates the samples were collected, company and individual collecting the sample, identification of sampling method used, sample mass, number of samples (if composite sample), location of fuel when sample taken, date of analysis, and company and individual conducting the analysis.

  The permittee shall also obtain a sulfur analysis on each shipment of coal received that indicates sulfur content on a weight percent basis. Fuel supplier certifications may be used for this purpose. The following information shall be obtained on each shipment of coal received:

  - The name of the fuel supplier;
  - The date on which the coal was received;
  - The quantity of coal delivered in the shipment;
  - The sulfur content of the coal delivered, expressed in weight percent;
  - Documentation of sampling of the coal, indicating the location of the fuel when the sample was taken, and;
  - The methods used to determine the sulfur content of the coal.

  The fuel supplier certifications and information shall be reported to the DEQ, Director Southwest Regional Office quarterly, within 30 calendar days after the end of the calendar quarter. The permittee shall provide the details, computations, and calculations used to determine sulfur content on an as-received basis and on an as-fired basis.

  Fuel sampling and analysis, independent of that used for certification, may be required or conducted by DEQ.
  (Condition 4 of the SOP dated 1/13/2009 (as amended 10/19/2009))

- The permittee shall maintain records of all emission data and operating parameters necessary to demonstrate compliance. These records shall include, but are not limited to:
  - Continuous monitoring system data on both boiler stacks (CS012 and CR3) for sulfur dioxide (SO_2) emissions and opacity;
  - The tons of coal consumed in each of the three boilers (Units 1, 2, and 3) on a daily, monthly, and annual basis;
  - All fuel certifications;
  - Quarterly emissions calculations for sulfur dioxide, as required to demonstrate compliance with the emissions limitations;
  - The sulfur (weight %), ash (weight %), and heat content (Btu/lb) of the coal combusted in Units 1, 2, and 3;
  - The average hourly ammonia slip concentration for each boiler exhaust, expressed in parts-per-million (ppm); and
  - Scheduled and unscheduled boiler maintenance, and operator training.

  (Condition 7 of the SOP dated 1/13/2009 (as amended 10/19/2009) and Condition 12.b of the NSR permit dated 3/23/2010)

- Within 30 days of the end of each calendar quarter, the permittee shall prepare and maintain reports of SO_2 emissions in lb/hr and lb/MMBtu for each boiler stack (1 and 2), expressed on hourly, 3-hour block average, and 24-hour block average bases. Beginning with the third quarter of 2009 and continuing for a period of two (2) calendar years, copies of these reports shall be submitted to the Director, Southwest Regional Office, within the 30 day period. (Condition 8 of the SOP dated 1/13/2009 (as amended 10/19/2009))

Testing:

There are no new testing requirements in the SOP dated 1/13/2009 (as amended 10/19/2009) or the NSR permit dated 3/23/2009.

State-Only Applicable Requirements:

There are no new state-only applicable requirements in the SOP dated 1/13/2009 (as amended 10/19/2009) or the NSR permit dated 3/23/2009.

Streamlined Requirements:

The 3-hour average SO_2 emission limitations from Condition 5 of the SOP dated January 13, 2009 (as amended October 19, 2009), are more restrictive than the previous 8.3 tons/hr combined limit on the three boilers (as listed in Condition III.A.2 of the Title V permit issued May 8, 2009). The previous hourly limit was based on 2.64 lbs of SO_2/MMBtu multiplied by the combined nominal Btu ratings of the three boilers. The new limits are based on a 3-hour average of 1.08 lbs of SO_2/MMBtu multiplied by the Btu ratings of the boilers connected to each stack. Since the new limits are more restrictive, they will streamline the previous SO_2 limitation.

INAPPLICABLE REQUIREMENTS

No new inapplicable requirements have been identified since the previous federal operating permit was issued.

INSIGNIFICANT EMISSION UNITS

No new insignificant emissions units have been added to the facility since the previous federal operating permit was issued.

CONFIDENTIAL INFORMATION

The permittee did not submit a request for confidentiality. All portions of the Title V application are available for public review.

PUBLIC PARTICIPATION

A public notice appeared in The Lebanon News on June 29, 2011 announcing a 30-day public comment period for the significant modification to the Title V permit. Notice was also provided to Kentucky, North Carolina, Tennessee, and West Virginia as affected states. Comments were received from Mr. Cale Jaffe (Southern Environmental Law Center) and Mr. Edwin Shelton (AEP Clinch River Plant). No requests for a hearing were received.

Response letters were sent to Mr. Jaffe and Mr. Shelton on August 15, 2011. The issues and concerns raised by Mr. Jaffe and Mr. Shelton did not result in any changes to the draft permit documents.

The EPA 45-day review of the proposed permit began on August 15, 2011, and comments were received on September 19, 2011. EPA's comments consisted of a single recommendation that did not result in any changes to the proposed permit document.